Florentin Smarandache

readup buildup

thync

instant α-readings

Columbus | 2015

Florentin Smarandache

READUP BUILDUP. *Thync*

instant α-readings

Columbus, 2015

"Let the future tell the truth, and evaluate each one according to his work and accomplishments. The present is theirs; the future, for which I have really worked, is mine".

-- Nikola Tesla

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DATA MINING & INFORMATION FUSION

READUP BUILDUP. Thync is the third volume of α-instant readings put up by Florentin Smarandache. Although the style of the reading logs is uniform in the three volumes so far (rough and ready, kernel-extracting, absence of any secondary remarks, and thus masking the author-*summarizator*), this one address only technical issues from two topics of interest for the author (information fusion / data mining), unlike in previous eclectic books. Notes are taken directly from the source language (one language in this log, more languages in the previous logs), and there are not abrupt transitions anymore in the selection of information. All works annotated here are from authoritative scientific sources, no more popularizers or debasers.

The title of the volume is an aftereffect of juxtaposition of the verb *think*, and the noun s*yncronization*, resulting in an incentive - unveiled from the first chapter of readings: *Think in sync*!

Far from being just a call to thinking synchronously, the notes speak about communication as *activity-together*, where the interlocutors share information.

Very likely, it resides right here the drive for publication of the instant readings series: *to share*. Besides, of course, multiple other layers of connotation (demonstrative or *paideuma*-tic), the reading series resemble an allegorical car, a carriage packed with books and bookmarks, which the author-*summarizator* shook of ideas. For personal use, but as well for a possible satisfaction of a possible spectator, necessarily perceived as a passer in a hurry, with no aptitude to dawdling around.

NIKOS VASILIOU

THINK IN SYNC

- ✓ Communication is getting "in sync" with others.
- ✓ Verbal communication is a joint activity by which interlocutors share information.
- ✓ People match their steps perfectly as they walk, and imitate each other's gestures as they talk, and use each other's phrases and grammar.
- ✓ Little is known about the neural mechanisms underlying the transfer of linguistic information across brains.
- ✓ Uri Hasson, Lauren Silbert and Greg Stephens recorded Silbert telling a 15-minute story while an MRI scanner recorded changes in activity levels in various regions of her brain.
- ✓ Researchers then played the recording to volunteers while their brains were MRI-ed.
- ✓ As they listened, their brains' patterns of activity matched Silbert's!
- ✓ Predictive anticipatory responses.
- ✓ Physiological basis for the pleasure people take in synchronized activities, e.g. singing together, marching together, so on.
- ✓ Recognize each other's thoughts and emotions.

- ✓ Similarity of the brain activity model of partners.
- ✓ Some couples are so harmonious that their brain starts working “on the same wavelength”.
- ✓ There are millions of neurons in the brain, each producing its own electrical signals.
- ✓ Two brain areas involved in learning - the prefrontal cortex and the striatum - synchronize their brain waves to form new communication circuits.
- ✓ The brain waves of two musicians synchronize when they are performing duet.
- ✓ Neural basis for interpersonal coordination.

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MULTI-SENSOR DATA FUSION

- ✓ Data fusion: process of integration of multiple data and knowledge representing the same real-world object into a consistent, accurate, and useful representation.
- ✓ Combines several sources of raw data to produce new raw data.
- ✓ Fused data must be more informative and synthetic, more accurate, more complete, more dependable than the original inputs.
- ✓ Multi-sensor data fusion (also known as Sensor Fusion) is a subset of information fusion.
- ✓ Fusion levels:
  - ✓ Level 0: Source Preprocessing/subject Assessment;
  - ✓ Level 1: Object Assessment;
  - ✓ Level 2: Situation Assessment;
  - ✓ Level 3: Impact Assessment (or Threat Refinement);
  - ✓ Level 4: Process Refinement;
  - ✓ Level 5: User Refinement (or Cognitive Refinement).

- ✓ Sensory fusion: unification of visual excitations from corresponding retinal images into a single visual perception (a single visual image).
- ✓ Examples of sensors:
  - ✓ Radar;
  - ✓ Sonar;
  - ✓ Seismic sensors;
  - ✓ Magnetic sensors;
  - ✓ Infra-red / thermal imaging camera;
  - ✓ TV cameras;
  - ✓ Electronic Support Measures (ESM);
  - ✓ Accelerometers;
  - ✓ Global Positioning System (GPS).
- ✓ Situation assessment, threat assessment.
- ✓ Systems-level information fusion design (Blasch, 2012).
- ✓ Centralized vs. Decentralized Fusion: where the fusion of the data occurs.
- ✓ Micro and nano-scale sensors 2003.
- ✓ Wireless communication.
- ✓ Statistical estimation.
- ✓ Signal processing.
- ✓ Information sciences.
- ✓ Artificial intelligence.
- ✓ Automatic target recognition.

- ✓ Automatic situation assessment.
- ✓ Identification-friend-foe-neutral (IFFN) systems.
- ✓ Smart weapons.
- ✓ Process models.
- ✓ Level of fusion processing.
- ✓ Types of fusion functions.
- ✓ Data understanding.
- ✓ Human-in-the-loop decision making.
- ✓ System engineering.
- ✓ Fusion systems.
- ✓ Attribute fusion.
- ✓ Data alignment.
- ✓ Data/object correlation.
- ✓ Position&Kinematic attribute estimation.
- ✓ Object identify estimation.
- ✓ Cognitive-based models:
  - ✓ Voting method;
  - ✓ Bayesian method;
  - ✓ DST.
- ✓ Weights for sensors.
- ✓ Distribute belief over propositions.
- ✓ Evidential interval.
- ✓ Dependent evidence.
- ✓ JDL model.

- ✓ Extract automatically information from a document (automated agents).
- ✓ Automated surveillance tracking, automated information fusion, automated situation assessment, automated sensor management.
- ✓ Recognition of patterns.
- ✓ Intelligent machines.
- ✓ Information analysts.
- ✓ Effective decision making.
- ✓ Multiple sonars detect submarines.
- ✓ Taxonomy of algorithms.
- ✓ Test-beds, prototypes.
- ✓ Data alignment (spatio-temporal, evidence conditioning, data normalization).
- ✓ Data association (hypothesize entities).
- ✓ Data fusion is a continuous process.
- ✓ Position, identity, and attribute estimates.
- ✓ Genetic algorithms.
- ✓ Bayesian Nets.
- ✓ Monte Carlo simulations.
- ✓ Decision treshold.
- ✓ The more sensors (sources) the better.
- ✓ No perfect sensors available.
- ✓ Difficult to predict sensor performance.
- ✓ No true fusion of imagery.

- ✓ Insufficient training data.
- ✓ Parametric modelling.
- ✓ Fourier transform (transforms a function to another function).
- ✓ Hilbert space.
- ✓ Dynamical systems.
- ✓ Energy detection.
- ✓ Hypothesis testing.
- ✓ Azimuth/elevation.
- ✓ Electronic intelligence.
- ✓ Communication intelligence.
- ✓ ESM = Electronic Support Measures.
- ✓ Decreasing signal-to-noise ratio we get JAMMING.
- ✓ Adding specific signals one creates false alarm (= DECEPTION).
- ✓ Electronic warfare:
  - ✓ Deception (inserting false information in opponent's communication);
  - ✓ Disruption;
  - ✓ Exploitation (extracting information from opponent's system);
  - ✓ Destruction.
- ✓ Covariance error analysis.
- ✓ Countermeasures.

- ✓ Relative radial velocity (Doppler).
- ✓ Active tracking, passive tracking.
- ✓ Pathetic cognitive models.
- ✓ Knowledge representation.
- ✓ Use hybrid methods.
- ✓ Human computer interface (HCI).
- ✓ Computer recognition of faces, of concepts of harmony.
- ✓ Multiple hypotheses tracking (Random Set Theory).
- ✓ Approximate reasoning.
- ✓ What architecture should be use? (Where in the processing flow should data be fused?) (David L. Hall, Amulya Garga).
- ✓ Multiprocessing, preprocessing.
- ✓ Data management.
- ✓ Unconventional warfare.
- ✓ Avoid potential conflicts.
- ✓ Digitalization.
- ✓ Multilevel fusion.
- ✓ Reasoning under uncertainity.
- ✓ Classification of targets.
- ✓ Cluster analysis.
- ✓ Neural networks.
- ✓ Parametric templates.

- ✓ Loss of information.
- ✓ Real-time processing.
- ✓ Testing of algorithms and knowledge.
- ✓ Measure of performance.
- ✓ Measure of effectiveness.
- ✓ False alarm rate.
- ✓ Maintenance.
- ✓ Logical inferences.
- ✓ Sensor management.
- ✓ Response time.
- ✓ Data from external sensors.
- ✓ What is the lifecycle of something.
- ✓ Single sensor processing.
- ✓ How the sensors work?
- ✓ Conduct surveillance.
- ✓ Magnetometers.
- ✓ Acoustic detectors.
- ✓ X-ray and gamma ray detects nuclear particles.
- ✓ Mass spectrometers detect non-nuclear particles.
- ✓ Seismometers.
- ✓ Measurement variables.
- ✓ Heuristic data.
- ✓ Metasensor processing.

- ✓ Covariance is a measure (in statistics) of the association between two random variables x and y;
- ✓ $Cov(x, y)$ = the expected value of the product of their derivations from the mean.
- ✓ It may be estimated by the sum of products of deviations from the sample mean for the associated values of the two variables, divided by the number of sample points.
- ✓ Variance = a measure of the dispersion of the distribution of a random variable.
- ✓ Obtained by taking the square root of the difference between the random variable and its mean: $Var(x) = E[(x - E(x)^2)]$.
- ✓ Sample variance: $s^2 = \sum_{i=1}^{n} \frac{(x_i - \bar{x}_i)^2}{n-1}$, where $\bar{x}$ is the mean.

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DATA ASSOCIATION

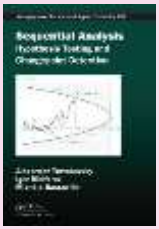
- ✓ Khun-Munkres Algorithm of Data Association.
- ✓ Sequential scan.
- ✓ Multiple scan.
- ✓ Maximize the number of assignments.
- ✓ Build a probabilistic model.
- ✓ A posteriori probability (bayes probability).
- ✓ Multiple hypothesis tracking (MHT).
- ✓ Hypothesized models.
- ✓ Dense target environment.
- ✓ Multiple measurements.
- ✓ Suboptimal method.
- ✓ Miscorrelations (missassociations).
- ✓ Multiple association.
- ✓ Hard assignement (unique), or soft assignement (non-unique) of data.
- ✓ Parametric fusion.
- ✓ Define the best fit.
- ✓ Models of observation.
- ✓ Fusion architecture.
- ✓ Observation = measurement (somehow).
- ✓ Degree of association between propositions.
- ✓ Use multiple filters.

- ✓ Maneuver detection.
- ✓ Maneuver models.
- ✓ Problems: miscorelations, noise, false alarm.
- ✓ Attribute fusion.
- ✓ Clustering method.
- ✓ Classification analysis.
- ✓ Iterative partitioning methods.
- ✓ Density search methods.
- ✓ Hierarchical divisive methods.
- ✓ Clumping methods.
- ✓ Target signature.
- ✓ Identity declaration.
- ✓ Feature extraction.
- ✓ Do not unquantify the unquantifiable.
- ✓ Predict the future.
- ✓ Reading minds.
- ✓ Assessment of symptoms.
- ✓ Determine abnormal parameters.
- ✓ Diagnostic tests.
- ✓ Cause-effect relationships.
- ✓ Mission analysis.
- ✓ Multi-perspective analysis.
- ✓ Countermeasure assessment.
- ✓ Predict enemy intent.
- ✓ Find threat opportunities.

- ✓ Find enemy's doctrine.
- ✓ High value target.
- ✓ Depict critical events.
- ✓ A priori intelligence.
- ✓ Cluster algorithms.
- ✓ Neural networks.
- ✓ Decision trees.
- ✓ Logical templates.
- ✓ Rule-based expert systems.
- ✓ Blackboard systems.
- ✓ Case-base reasoning.
- ✓ Bayesian Belief Nets.
- ✓ Agent-based systems.
- ✓ Hybrid reasoning.
- ✓ Decision theory: expected theory, multiattribute utility theory.
- ✓ Opportunistic reasoning.
- ✓ Self-learning systems.
- ✓ Man-machine interface.
- ✓ Sensitivity to new data.
- ✓ Learning from experience.
- ✓ Study similar cases.
- ✓ Accesss to databases.
- ✓ Convincing explanations.
- ✓ Stereotyped knowledge.

- ✓ Knowledge representation.
- ✓ Control theory.
- ✓ Process refinement (fusion level 4).
- ✓ Optimization algorithm.
- ✓ Target attribute modeling.
- ✓ Sensor platform model.
- ✓ Missing management.
- ✓ Sensor management.
- ✓ Sensor control.
- ✓ Metadata.
- ✓ Data, filtering.
- ✓ Event prediction.
- ✓ Level 5 fusion: cognitive refinement.
- ✓ Micro and nano-scale sensors.
- ✓ Wireless communications.
- ✓ Cognitive versus computational.
- ✓ Decomposing the problem.
- ✓ Formulate and refine queries.
- ✓ Multi-modal human-computer interface.
- ✓ Data interpretation.
- ✓ Default reasoning.
- ✓ Gesture recognition.
- ✓ Web-service approach.
- ✓ Cognitive modeling.
- ✓ Multiple hypotheses tracking.

- ✓ Theory of sequential hypothesis testing and quickest changepoint detection.
- ✓ Decision-theoretic (Bayesian) and non-decision-theoretic (non-Bayesian) contexts.
- ✓ Practical discrete-time models.



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ASSESSMENT & PROCESSING

- ✓ Khun-Munkres Algorithm of Data Association.
- ✓ Multi-sensor.
- ✓ Registration of image.
- ✓ 6 cameras creates one view.
- ✓ 66 megapixels.
- ✓ Gas map.
- ✓ Angelfire.
- ✓ Nyquist sampling.
- ✓ Frame to frame registration.
- ✓ Signal processing.
- ✓ Art of intuition.
- ✓ Thinking behind the rational.
- ✓ Art of prediction.
- ✓ Social behavior.
- ✓ Use science to predict.
- ✓ Alternative reality.
- ✓ How to influence people.
- ✓ Mind control.
- ✓ Lighting as weapon.
- ✓ Weather weapon.
- ✓ Gigantic radio transmitter.
- ✓ Low frequency transmitter.

- ✓ Change the dynamics of the atmosphere.
- ✓ Provoque drought.
- ✓ Wind change directions.
- ✓ Mystery machine.
- ✓ In ionosphere.
- ✓ Chemtrails – dispersing chemical into the atmosphere.
- ✓ Raise the temperature.
- ✓ Hurricanes, massive rains.
- ✓ Satellite-based weather weapons.
- ✓ Manipulation of weather.
- ✓ Hit-or-miss topology.
- ✓ Probability measure.
- ✓ Observation space.
- ✓ Belief measure of the randomly varying finite set.
- ✓ Infinitely monotone capacity.
- ✓ Global density function.
- ✓ Random subset of a space.
- ✓ Hybrid space.
- ✓ Lexicographic ordering.
- ✓ Hybrid space is a cartesian space.
- ✓ Lebesgue measure.
- ✓ Combining logic with probability (Nillson).
- ✓ Motion detection by frame differencing.

- ✓ Flux tensor.
- ✓ Recovery plan.
- ✓ Defining threat.
- ✓ Impact assessment.
- ✓ Automatic network process.
- ✓ Analyst look for data, understanding, simulating.
- ✓ Worse case situation.
- ✓ Explore different alternatives.
- ✓ Network sensor.
- ✓ Inundated with data.
- ✓ High level fusion (panel discussion).
- ✓ Cyber example: internet attack.
- ✓ Compromise web server.
- ✓ Discover the server.
- ✓ Firewall.
- ✓ Possible futures.
- ✓ Potential attack.
- ✓ Increase or decrease uncertainity.
- ✓ Vulnerability.
- ✓ Directions for high-level fusion.
- ✓ Rank the activities.
- ✓ Overall process.
- ✓ Greater understanding of the situation.
- ✓ Analyse alternate scenarios.

- ✓ Impact on mistakes.
- ✓ Hard to predict human behavior.
- ✓ Cultural implications.
- ✓ Group threat in cyber world.
- ✓ Vizualization of the situation.
- ✓ Fusion models.
- ✓ Define a risk, risk tolerance.
- ✓ Assess criticality.
- ✓ Robust verification.
- ✓ Validation data.
- ✓ Resolve ambiguities.
- ✓ Managing uncertainity.
- ✓ Spiral development.
- ✓ Automation.
- ✓ Projection to the future.
- ✓ Key events.
- ✓ Granularity model.
- ✓ Clarify concept.
- ✓ Passive radar.
- ✓ Projecting stats (past, present, future).
- ✓ Estimating and predicting scenarios.
- ✓ Estimating cost of future situations.
- ✓ Impacts assessment "If x follows this course of action, what will be the outcome?"
- ✓ Pending situation.

- ✓ Inferring relationships.
- ✓ Goal development.
- ✓ Capability development.
- ✓ Situation development.
- ✓ Interactions.
- ✓ Red plane, blue plane.
- ✓ Collateral effects.
- ✓ Behavior model.
- ✓ Defuzzify.
- ✓ What's enemy's intent.
- ✓ Degree of negativeness of their impact.
- ✓ Game theory.
- ✓ Process refine.
- ✓ Plan, re-plan.
- ✓ How to approach.
- ✓ Re-use.
- ✓ Taxonomy.
- ✓ Ontologies.
- ✓ Disparate data.
- ✓ Adaptation to change.
- ✓ Motivation.
- ✓ Hypothesis management.
- ✓ A research agenda.
- ✓ Adaptive learning.
- ✓ Multi-revolution reasoning.

- ✓ Self-evaluation.
- ✓ Dimensionality of the problem.
- ✓ Problems not being possible to be modeled.
- ✓ Dynamic of levels 1, 2, 3 of fusion.
- ✓ Tracking an idea.
- ✓ Understand the problem.
- ✓ Improve Shannon entropy: degree of intersection.
- ✓ Adversary's intent.
- ✓ Human factor research.
- ✓ Mental model.
- ✓ Rapid adaptable model.
- ✓ We don't use automated data mining techniques.
- ✓ Dynamic networks (graphs).
- ✓ Dynamic analog.
- ✓ Assignement graph.
- ✓ Disassortative.
- ✓ Kronecker sum of matrices.
- ✓ Semi-Markov processes.
- ✓ Markov logic.
- ✓ Weights learned from data.
- ✓ Markov networks.
- ✓ Social examples.
- ✓ Higher-order network.

- ✓ Sensitivity analysis.
- ✓ Overfeeding the data.
- ✓ Get an expected value very quickly.
- ✓ Likelihood-base optimization.
- ✓ Random graph model.
- ✓ Pattern of interest.
- ✓ Subgraph.
- ✓ Detection of random graphs.
- ✓ Periscope detection.
- ✓ Evidence graph.
- ✓ Partial observation.
- ✓ Intelligence analysis.
- ✓ Spatial distribution.
- ✓ Nontraditional targets.
- ✓ Unresolved target.
- ✓ Constraints.
- ✓ Graph similarity and dissimilarity.
- ✓ Fusing maps.
- ✓ Look for intersection points on the map in order to match image with map; find corners.
- ✓ Battle stress.
- ✓ Adaptive system.
- ✓ Object-oriented probabilistic programming.
- ✓ Probabilistic model.
- ✓ Increase richness.

- ✓ Learning algorithm from data.
- ✓ Inference.
- ✓ Develop computer languages for a specific application.
- ✓ What-if reason.
- ✓ I don't know what I don't know.
- ✓ Discarded hypotheses.
- ✓ Intrusiveness.
- ✓ Performance evaluation.
- ✓ Matrices development.
- ✓ Precision fragmentation.
- ✓ Take info from blogs.
- ✓ Develop a system.
- ✓ Learn quickly, adopt quickly.
- ✓ Scale your algorithm.
- ✓ Man an machine together working (interaction).
- ✓ Hypotheses generation.
- ✓ Mission control.
- ✓ Fight with huge amount of data.
- ✓ 30.000 video cameras in London, UK.
- ✓ Situation understanding, perception.

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http://www.multisensorproject.eu/

SECRECY VS. INFORMATION

- ✓ Secret knowledge.
- ✓ Secret power.
- ✓ Secret ritual.
- ✓ Open society with secret.
- ✓ Small intercycle, innercycle.
- ✓ Bizzare ritual.
- ✓ Secret society.
- ✓ Skull and bones society.
- ✓ Initiation.
- ✓ Seeking to impose their will.
- ✓ Conspiracy.
- ✓ Seek global domination.
- ✓ The art of deception.
- ✓ Invest rituals.
- ✓ Contractions to reconcile.
- ✓ Conspiracy Theory.
- ✓ Defeat ignorance.
- ✓ Get everyone's opinion.
- ✓ Accept council.
- ✓ Secret style.
- ✓ Man of the people.
- ✓ Good public speakers.

- ✓ Importance of the press.
- ✓ Simply ignore things criticizing you (Jefferson did).
- ✓ Do your homework.
- ✓ World politics.
- ✓ Political machine.
- ✓ Make tough decision.
- ✓ Sense of humor.
- ✓ Game of politics.
- ✓ Decision maker.
- ✓ Teach yourself.
- ✓ Stay on top of news.

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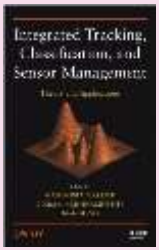
CONFIDENCE LEVEL OF INFORMATION

- ✓ Heavy/light tracked.
- ✓ Change in doppler.
- ✓ Set treshold.
- ✓ Clasify fusion (3 classifiers).
- ✓ Classes of objectives.
- ✓ Reduce the dimensionality of data.
- ✓ Class attributes.
- ✓ Decision tree.
- ✓ Toolbox.
- ✓ Minim toolkit.
- ✓ Feature fusion.
- ✓ Voting mechanism.
- ✓ Learn a pattern.
- ✓ Manifold of each system.
- ✓ Statistically independent.
- ✓ Probability of containment, of detection, of success.
- ✓ Two frames of discernment.
- ✓ Frame of discernment: the grid.
- ✓ Probability of false alarm.
- ✓ Continuous belief function.

- ✓ Target not moving.
- ✓ Measures of dissimilarity.
- ✓ Equi-reliable.
- ✓ Micro-sources, micro-sensors.
- ✓ Similar sensor fusion.
- ✓ Fusion of classes of sensors.
- ✓ Find the reliability of sensors.
- ✓ Refine the reliability.
- ✓ Combine in a batch mode.
- ✓ Continuous refinement (a loop).
- ✓ Corroboration degree.
- ✓ Class of mass functions: distance between masses.
- ✓ Decision function.
- ✓ Reduce the number of focal elements.
- ✓ Conflict function.
- ✓ Reliability – fiability of a source to be correct, based on statistical data; it is objective.
- ✓ Credibility is subjective; about personal believe about a fiability of a source (when the objective fiability is not known).
- ✓ Uncertainity of hypothesis x / with respect to a source.
- ✓ Algorithm development and mathematical analysis for filtering, multi-target multi-sensor

tracking, sensor management and control, and target classification.

- ✓ Bayesian modeling and filtering methods, multi-target tracking approaches, target classification procedures, and large scale sensor management problem-solving techniques.
- ✓ Extended Kalman filters.
- ✓ Performance bounds for target tracking: computationally efficient formulations and associated applications.
- ✓ Track-before-detect techniques.
- ✓ Intent inference and detection of anomalous trajectories: a metalevel tracking approach.
- ✓ Trajectory modeling and inference using stochastic context-free grammars.
- ✓ Trajectory modeling and inference using reciprocal processes (rp).
- ✓ Distributed detection and decision fusion with applications to wireless sensor networks.
- ✓ Evidential networks for decision support in surveillance systems.



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LOW OBSERVATION FUSION TECHNOLOGY

- ✓ Disparate data.
- ✓ Data association technics.
- ✓ Holonic fusion.
- ✓ Low fliers.
- ✓ Space tracking – weaponize space.
- ✓ Antisatellite weapon.
- ✓ Image satellites.
- ✓ Space situation awareness.
- ✓ Multi-moving target indicator.
- ✓ False alarm – mistake.
- ✓ Association techniques.
- ✓ Robust tracking algorithm.
- ✓ Optimize position of sensors.
- ✓ Layered sensing.
- ✓ Degree of nonlinearity: dawn filter, alfa-beta filter, weiner filter, alfa beta gama filter.
- ✓ Random set is used.
- ✓ Generalization of a random finite set of random infinite set.
- ✓ Random Set Models of Neutrosophic Evidence.

- ✓ New mathematical and physical concepts to be applied to fusion.
- ✓ Unexplored areas of fusion research.
- ✓ Multi-tensor homographic.
- ✓ Computer vision image fusion.
- ✓ Out-of-sequence measurement and track data handling.
- ✓ Application of multi-tensor.
- ✓ Homographic fusion notions are identified together with the nash approach, the pursuit-evasion approach to threat.
- ✓ Situation outcome determination, and the out-of-sequence measurement and track solutions.
- ✓ The theory of data fusion has become important to military applications and in particular, tracking applications.
- ✓ Deployment of a trifocal tensor can be used for this process where each "camera" view is related by a fundamental matrix.
- ✓ Game theory has become extremely popular for evolutionary AI purposes.
- ✓ Game theory aids us in performing important tasks in level 3 fusion.
- ✓ Seven particle filtering algorithms:
    - ✓ Sequential Importance Sampling (SIS);

- ✓ Resampling Algorithm;
- ✓ Generic Particle Filter;
- ✓ Sampling Importance Resampling (SIR);
- ✓ Auxiliary Particle Filter;
- ✓ Regularized Particle Filter;
- ✓ "Likelihood" Particle Filter.

Mark G. Alford, Eric C. Jones, Adnan Bubalo, Melissa Neumann, Michael J. Greer: COMPLEMENTARY ADVANCED FUSION EXPLORATION. Air Force Research Laboratory/IFEA

SOFT FUSION AND SOCIAL ANTHROPOLOGY

- ✓ Behavior modeling.
- ✓ Soft information fusion.
- ✓ Decision-making in complex environment.
- ✓ Soft data and hard data.
- ✓ Dynamic real situation.
- ✓ Situation prediction.
- ✓ Hard (electronic sensor) and soft (human observer) data.
- ✓ Soft decision – influence and coercion.
- ✓ Direct and indirect effects.
- ✓ Demoralize, paralize, divert.
- ✓ Degree of uncertainity.
- ✓ Re-usable knowledge.
- ✓ Determine emotional state of a group.
- ✓ Influence modeling.
- ✓ Socio-cultural data.
- ✓ Structured and unstructured data.
- ✓ Survey is sophisticated.
- ✓ Use models for the survey.
- ✓ Epistemic policies.
- ✓ Frequencies of keywords.

- ✓ Open source intelligence.
- ✓ TV news manipulated.
- ✓ Reliability of source and credibility of reported information.
- ✓ Potentially adversial situation.
- ✓ Exploring human behaviour.
- ✓ Experimental psychology.
- ✓ Psychology of masses.
- ✓ Social networks.
- ✓ Ubiquitous communications.
- ✓ Modeling team decision.
- ✓ Experimental social and cultural management.
- ✓ Asymmetrical flights.
- ✓ Get the support of the population.
- ✓ Model of group behaviour.
- ✓ Small decisions can have big consequences.
- ✓ Understand the social-cultural-religious facts, mood of crowd.
- ✓ Many sub-cultures within one culture.
- ✓ Continuously updating.
- ✓ Cultural known can be utilized.
- ✓ Identify where to invest.
- ✓ Adapting.
- ✓ Atypical opportunity.
- ✓ How to simulate the human behaviour.

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SOCIAL INTELLIGENCE, INTERCULTURAL COMMUNICATION

- ✓ Behavior modeling.
- ✓ Soft information fusion.
- ✓ Coordinate one's behaviour with others.
- ✓ Social intelligence design.
- ✓ Web intelligence.
- ✓ Empathy.
- ✓ Sharing the hypothesis.
- ✓ Manage relationships.
- ✓ Synergy.
- ✓ Social psichology.
- ✓ Cultural change.
- ✓ An agent may help.
- ✓ Simulate.
- ✓ Empathy at: verbal, reasoning, behavior, cognition, physiological level.
- ✓ The more an hypothesis is shared, the more empathy is gained.
- ✓ Communication style.
- ✓ Neurophysiology.
- ✓ View from other prospect.

- ✓ Construct a virtual space.
- ✓ Emotional state.
- ✓ Compassion.
- ✓ Measurement of interactions.
- ✓ Learning by mimicking.
- ✓ Behavior generator.
- ✓ Finding motifs.
- ✓ Updating estimation.
- ✓ Revising proposal.
- ✓ Nonverbal communication skills.
- ✓ Robot can dance along with people.
- ✓ Use immersive collaboration.
- ✓ Dynamic programming.
- ✓ Forward-backward analysis.
- ✓ Sensor module.
- ✓ Fatigue detection.
- ✓ Pattern detection.
- ✓ Posturography.
- ✓ Attribute value reduction.
- ✓ How to measure simplicity.
- ✓ Simplicity measure.
- ✓ Granulation algorithm.
- ✓ Re-adaptability.
- ✓ Use topological space for caracterizing neighborhood.

- ✓ Indiscernability relation.
- ✓ Partition.
- ✓ Incomplete data.
- ✓ Lost values.
- ✓ Rule extraction algorithm.

https://www.karlalbrecht.com/

http://www.danielgoleman.info/topics/social-intelligence/

DECISION MAKING

- ✓ An absolute logic.
- ✓ Truth in multiple forms.
- ✓ Machine-centered century.
- ✓ Social technologies.
- ✓ Find the potential.
- ✓ Intuitive creativity.
- ✓ Info based on images.
- ✓ Learning.
- ✓ Human creates value.
- ✓ Mental satisfaction.
- ✓ Positive emotions.
- ✓ Comfortableness.
- ✓ Interest and pleasure.
- ✓ Descartes dualism.
- ✓ Universality.
- ✓ Reason plus emotional.
- ✓ Perception-representation.
- ✓ Knowledge that cannot be verbalized.
- ✓ Easy to use – looks easy to use.
- ✓ Intrinsec mode functions.
- ✓ Intrinsec discontinuity.
- ✓ Poor modeling of processing data.

- ✓ Warping transformation.
- ✓ Defect modeling.
- ✓ Rough set (1982).
- ✓ Supersociety (society of societies).

Markkula Center for Applied Ethics
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Psychology Today
https://www.psychologytoday.com/basics/decision-making

DATA MINING IN BIOINFORMATICS

- ✓ Data integration, data interpretation.
- ✓ Bioinformatics: umbrella term for the biological studies using computer programming as part of methodology.
- ✓ Term coined by Paulien Hogeweg and Ben Hesper in 1970 to refer to the study of information processes in biotic systems.
- ✓ Mining bioinformatics data: intersection between bioinformatics and data mining.
- ✓ Data-intensive computations used in data mining with applications in bioinformatics.
- ✓ Data mining techniques, technologies, and frameworks for storing, analyzing, and extracting knowledge from large databases in the bioinformatics domains.
- ✓ Large amount of differences among data.
- ✓ Need for benchmarking of inferences derived from clustering&classification.
- ✓ Biochemical reactions.
- ✓ Interface.
- ✓ Database.

- ✓ High level noise.
- ✓ Discover mapings between data and ontologies.
- ✓ Meta-search.
- ✓ Model matching.
- ✓ Search by gene sequences.
- ✓ Query interface.
- ✓ Metamodel.
- ✓ Collect information from millions of papers.
- ✓ Mining methods.
- ✓ Make a structure (detect).
- ✓ Automatic pattern.
- ✓ Relation generation.
- ✓ Text clustering.
- ✓ Include relationship in the search.
- ✓ Relevance of the results.
- ✓ Pattern generation.
- ✓ Association weights.
- ✓ Graph-based mining.
- ✓ Random model.
- ✓ Small-world model.
- ✓ Scale-free model.
- ✓ Random geometric model.
- ✓ Modular structure.
- ✓ Hierarchical structures.
- ✓ Network, sub-network.

- ✓ Prefix, infix, suffix.
- ✓ Testing hypotheses.
- ✓ Transnational education.
- ✓ Internationalization.
- ✓ Higher competition in globalization.
- ✓ E-learning.
- ✓ Partnership.
- ✓ Intelligent marketing.
- ✓ Making networks.
- ✓ No professional compromising.
- ✓ Getting various experiences.
- ✓ Cooperation, interaction.
- ✓ Sociobiology – society of animals.
- ✓ Not only the natural selection functions, but also the society contributes to the shaping of a species.
- ✓ We know 1,8 million species, but there might be 100 million (we didn't discover all of them).
- ✓ Net neutrality.
- ✓ Internet of risk.
- ✓ For open internet.
- ✓ Monopolize the traffic in internet.
- ✓ Freedom of information.
- ✓ High speed broad band internet.

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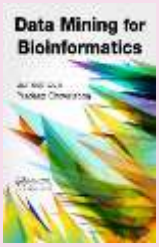

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Editor: Inderscience, independent journal publisher
http://www.inderscience.com/

Michael Barton, post-doctoral researcher in bioinformatics.
http://www.bioinformaticszen.com/
https://twitter.com/bioinformatics

ROUGH SET FOR DATA MINING

- ✓ Approximate reasoning.
- ✓ Lower and upper aproximation.
- ✓ Algorithm design.
- ✓ Matroid-generalization of linear independence.
- ✓ Knowledge representation.
- ✓ Rule induction.
- ✓ Neighbordhood system.
- ✓ Tolerance relation.
- ✓ Incomplete information.
- ✓ Decision system.
- ✓ Attribute reduction.
- ✓ Check the consistency.
- ✓ Check the attributes.
- ✓ Find association rules.
- ✓ Onthology represented by a graph.
- ✓ Knowledge – representation, inference, base, reduction.
- ✓ Decompress a problem in sub-problems.
- ✓ Connection with toplogy.
- ✓ Rough matroid.
- ✓ Fuzzy matroid.

- ✓ Connection with ontology.
- ✓ Upper and lower approximation.
- ✓ Knowledge structure.
- ✓ Exploit knowledge.
- ✓ Derived partition.
- ✓ Nonbinary relations.
- ✓ Granular structure.
- ✓ Generalized rough set.
- ✓ Inclusion relationship.
- ✓ Division chart.
- ✓ Non-deterministic information system.
- ✓ Study consistency.
- ✓ Three-valued logics.
- ✓ Einstein's special theory of relativity – CERN results.
- ✓ Object-oriented computer science.
- ✓ Approximate structure.
- ✓ Web security.
- ✓ Data mining.
- ✓ Granular mathematics.
- ✓ Axiomatization.
- ✓ Major applications.
- ✓ Models.
- ✓ Granule – region of uncertainity.
- ✓ Hyperreal numbers (1968).

- ✓ Fuzzy numbers.
- ✓ Infinitesimal.
- ✓ Granull represents.
- ✓ Sub-algorithm.
- ✓ Uncertainity.
- ✓ Fight between fuzzy of probability.
- ✓ Discrete math.
- ✓ Rough set (Pawlek, 1982).
- ✓ Set of black boxes.
- ✓ Partition.
- ✓ Attribute.
- ✓ Set of fuzzy subsets.
- ✓ Interactions of such sets.
- ✓ Simplex.
- ✓ Knowledge structure.
- ✓ Linguistic structure.
- ✓ Topological equivalence.
- ✓ Work with functions not well defined.
- ✓ Applications: association rule in mining.
- ✓ Discutional access control.
- ✓ Neighborhood system, relation.
- ✓ Non-standard number.
- ✓ Paralled computing.
- ✓ Finite automata.

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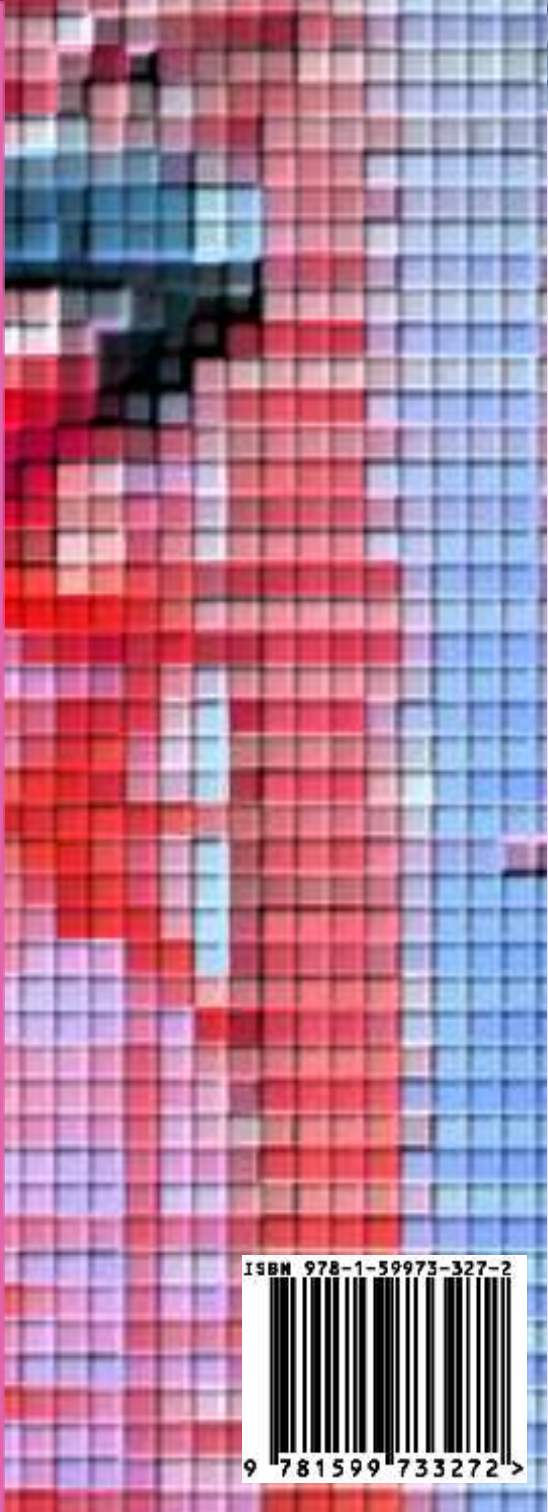
READUP BUILDUP. Thync is the third volume of α- instant readings put up by Florentin Smarandache. Although the style of the reading logs is uniform in the three volumes so far (rough and ready, kernel-extracting, absence of any secondary remarks, and thus masking the author-*summarizator*), this one address only technical issues from two topics of interest for the author (information fusion / data mining), unlike in previous eclectic books. Notes are taken directly from the source language (one language in this log, more languages before), and there are not abrupt transitions anymore in the selection of information. All works annotated here are from authoritative scientific sources, no more popularizers or debasers.

The title of the volume is an aftereffect of juxtaposition of the verb *think*, and the noun *syncronization*, resulting in an incentive - unveiled from the first chapter of readings: *Think in sync*! Far from being just a call to thinking synchronously, the notes speak about communication as *activity-together*, where the interlocutors share information. Very likely, it resides right here the drive for publication of the instant readings series: *to share*. Besides, of course, multiple other layers of connotation (demonstrative or *paideuma*-tic), the reading series resemble an allegorical car, a carriage packed with books and bookmarks, which the author-summarizator shook of ideas. For personal use, but as well for a possible satisfaction of a possible spectator, necessarily perceived as a passer in a hurry, with no aptitude to dawdling around.



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